

Serial No.: 09/850,040

Attorney Docket No.: 2001P08145US

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IN THE CLAIMS:

This listing of the claims will replace all prior versions and listings of the claims in the application:

1. (Currently Amended) A computer implemented method of enhancing sound quality for computer telephony systems, comprising:
  - receiving digital signals including telephony sounds;
  - performing time-to-frequency domain conversion on the digital signals;
  - detecting whether noise is present in the frequency domain conversion of the digital signals by examining amplitudes in a plurality of frequency bands and determining that noise is present by determining whether the amplitudes of the plurality of frequency bands cross a threshold; and
  - applying a filter to remove the noise if noise was detected in the frequency domain conversion of the digital signals.
2. (Currently Amended) The method of claim 1, A computer implemented method of enhancing sound quality for computer telephony systems, comprising:
  - receiving digital signals including telephony sounds;
  - performing time-to-frequency domain conversion on the digital signals;
  - detecting whether noise is present in the frequency domain conversion of the digital signals by examining amplitudes in a plurality of frequency bands; and
  - applying a filter to remove the noise if noise was detected in the frequency domain conversion of the digital signals;
  - wherein detecting whether noise is present comprises:
    - comparing the amplitude of sounds in the frequency domain conversion of the digital signals; and
    - determining noise is present [[if]] by determining whether the amplitude in a predetermined number of bands crosses a threshold.
3. (Currently Amended) The method of claim 1, A computer implemented method of enhancing sound quality for computer telephony systems, comprising:

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receiving digital signals including telephony sounds;  
performing time-to-frequency domain conversion on the digital signals;  
detecting whether noise is present in the frequency domain conversion of the  
digital signals by examining amplitudes in a plurality of frequency bands; and  
applying a filter to remove the noise if noise was detected in the frequency  
domain conversion of the digital signals;

wherein detecting whether noise is present comprises:

comparing the amplitude of sounds in a first band to the amplitude of  
sounds in a second band in the frequency domain conversion of the digital  
signals; and

determining noise is present if the amplitudes of sounds in the first and  
second bands are substantially the same;

wherein the first band comprises sounds outside the range of a human  
voice and the second band comprises sounds within the range of the human  
voice.

4. (Currently Amended) ~~The method of claim 1,~~ A computer implemented  
method of enhancing sound quality for computer telephony systems, comprising:

receiving digital signals including telephony sounds;  
performing time-to-frequency domain conversion on the digital signals;  
detecting whether noise is present in the frequency domain conversion of the  
digital signals by examining amplitudes in a plurality of frequency bands; and  
applying a filter to remove the noise if noise was detected in the frequency  
domain conversion of the digital signals;

wherein detecting whether noise is present comprises:

comparing the amplitude of sounds in low, middle and high bands in the  
frequency domain conversion of the digital signals; and

determining noise is present if the amplitudes of sounds in the low, middle  
and high bands are substantially the same.

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5. (Previously Presented) The method of claim 4, wherein the low band includes sounds less than 500 Hertz, the middle band includes sounds from 500 to 1500 Hertz and the high band includes sounds greater than 1500 Hertz.

6. (Withdrawn) The method of claim 1, wherein detecting whether noise is present comprises:

examining the amplitude of sounds at one or more power line frequencies in the frequency domain conversion of the digital signals over a time interval; and

determining noise is present if the amplitudes of sounds at the one or more power line frequencies cross a threshold over the time interval.

7. (Withdrawn) The method of claim 1, wherein the one or more power line frequencies include one or more of 50 Hertz, 60 Hertz, 100 Hertz, 120 Hertz, 150 Hertz, and 180 Hertz.

8. (Original) The method of claim 1, wherein detecting whether noise is present comprises:

examining the amplitude of sounds in a first band in the frequency domain conversion of the digital signals over a time interval; and

determining noise is present if the amplitude of sounds in the first band cross a threshold over the time interval.

9. (Original) The method of claim 1, wherein the filter is applied if noise is detected for a specific time period.

10. (Original) The method of claim 1, wherein the filter is no longer applied if noise is not detected for a specific time period.

11. (Original) The method of claim 1, wherein the filter is a software filter.

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12. (Currently Amended) A computer implemented method of enhancing sound quality for computer telephony systems, comprising:

- receiving digital signals including telephony sounds;
- performing time-to-frequency domain conversion on the digital signals;
- detecting whether noise is present in the frequency domain conversion of the digital signals if the amplitudes of sounds in first and second bands in the frequency domain conversion of the digital signals are substantially the same; and
- applying a filter to remove the noise if noise was detected in the frequency domain conversion of the digital signals;

wherein the first band comprises sounds outside the range of a human voice and the second band comprises sounds within the range of the human voice.

13. (Currently Amended) ~~The method of claim 12, further comprising:~~ A computer implemented method of enhancing sound quality for computer telephony systems, comprising:

- receiving digital signals including telephony sounds;
- performing time-to-frequency domain conversion on the digital signals;
- comparing the amplitude of sounds in a third band to ~~[[the]]~~ first and second bands in the frequency domain conversion of the digital signals; and
- determining noise is present if the amplitudes of sounds in the first, second and third bands are substantially the same; and
- applying a filter to remove the noise if noise was detected in the frequency domain conversion of the digital signals.

14. (Currently Amended) The method of claim ~~[[12]]~~ 13, wherein the first band includes sounds less than 500 Hertz, the second band includes sounds from 500 to 1500 Hertz and the third band includes sounds greater than 1500 Hertz.

15. (Currently Amended) The method of claim ~~[[12]]~~ 13, wherein the amplitude of sounds is an average over a time interval.

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16. (Original) A computer implemented method of enhancing sound quality for computer telephony systems, comprising:

receiving digital signals including telephony sounds;

performing time-to-frequency domain conversion on the digital signals;

detecting whether noise is present in the frequency domain conversion of the digital signals if the amplitude of sounds in a middle band exceed the amplitude of sounds in low and high bands by a predetermined amount; and

applying a filter to remove the noise if noise was detected in the frequency domain conversion of the digital signals.

17. (Original) The method of claim 16, wherein the low band includes sounds less than 500 Hertz, the middle band includes sounds from 500 to 1500 Hertz and the high band includes sounds greater than 1500 Hertz.

18. (Original) The method of claim 16, wherein the amplitude of sounds is an average over a time interval.

19. (Withdrawn) A computer implemented method of enhancing sound quality for computer telephony systems, comprising:

receiving digital signals including telephony sounds;

performing time-to-frequency domain conversion on the digital signals;

detecting whether noise is present in the frequency domain conversion of the digital signals if the amplitude of sounds at one or more power line frequencies in the frequency domain conversion of the digital signals cross a threshold over the time interval; and

applying a filter to remove the noise if noise was detected in the frequency domain conversion of the digital signals.

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20. (Withdrawn) The method of claim 19, wherein the one or more power line frequencies include one or more of 50 Hertz, 60 Hertz, 100 Hertz, 120 Hertz, 150 Hertz, and 180 Hertz.

21. (Withdrawn) The method of claim 19, wherein the amplitude of sounds is an average over a time interval.

22. (Currently Amended) A computer implemented method of enhancing sound quality for computer telephony systems, comprising:  
receiving digital signals including telephony sounds;  
performing time-to-frequency domain conversion on the digital signals;  
detecting whether noise is present in the frequency domain conversion of the digital signals if the amplitude of sounds in a plurality of frequency bands ~~first band~~ in the frequency domain conversion of the digital signals cross a threshold over a time interval; and  
applying a filter to remove the noise if noise was detected in the frequency domain conversion of the digital signals and replacing at least a portion of the noise with comfort noise.

23. (Original) The method of claim 22, wherein applying a filter comprises applying a low pass or high pass filter.

24. (Original) The method of claim 22, wherein the amplitude of sounds is an average over a time interval.

25. (Currently Amended) A computer implemented method of enhancing sound quality for computer telephony systems, comprising:  
receiving digital signals including telephony sounds;  
performing time-to-frequency domain conversion on the digital signals;  
detecting whether noise is present in the frequency domain conversion of the

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digital signals for a first specific time period by examining amplitudes in a plurality of frequency bands, said detecting including determining if the amplitudes in the plurality of frequency bands exceed a threshold; and

applying a filter to remove the noise if noise was detected in the frequency domain conversion of the digital signals.

26. (Original) The method of claim 25, wherein said filter applying step is not performed if noise is not detected for a second specific period longer than said first specific time period.

27. (Previously Presented) A computer program product that enhances sound quality for computer telephony systems, comprising:

computer code for a processor that receives digital signals including telephony sounds;

computer code that performs time-to-frequency domain conversion on the digital signals;

computer code that detects whether noise is present in the frequency domain conversion of the digital signals if the amplitude of sounds in a middle band exceed the amplitude of sounds in low and high bands by a predetermined amount;

computer code that applies a filter to remove the noise if noise was detected in the frequency domain conversion of the digital signals; and

a computer readable medium that stores the computer codes.

28. (Original) The computer program product of claim 27, wherein the low band includes sounds less than 500 Hertz, the middle band includes sounds from 500 to 1500 Hertz and the high band includes sounds greater than 1500 Hertz.

29. (Original) The computer program product of claim 27, wherein the amplitude of sounds is an average over a time interval.

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30. (Original) The computer program product of claim 27, wherein the computer readable medium is a CD-ROM, floppy disk, tape, memory, flash memory, system memory, hard drive, or data signal embodied in a carrier wave.

31. (Currently Amended) A computer implemented method of enhancing sound quality for computer telephony systems, comprising:

receiving digital signals, said digital signals being computer telephony signals and including an inbound maintone and an outbound maintone;

performing time-to-frequency domain conversion on the digital signals;

detecting whether noise is present in the frequency domain conversion of the digital signals by ~~comparing~~ determining whether amplitudes of a plurality of frequency bands of the digital signals are greater than or less than a threshold; and

selectively applying a filter to remove the noise from either the inbound maintone or the outbound maintone if noise was detected in the frequency domain conversion of the respective inbound maintone or outbound maintone.

32. (Previously Presented) A method in accordance with claim 31, further comprising passing the inbound maintone without noise filtering if a noise reduction has been already applied to the inbound maintone.